



EXPLANATION OF MAP

This map shows alluvial floodplain deposits as derived by geomorphic processing of a 30-meter resolution digital elevation model (DEM) overlain upon a USGS digital orthophoto derived from aerial photography for Puerto Barrios, Guatemala. The data shown on this map were collected after Hurricane Mitch, which affected Central America in 1998, and were designed to assist municipal governments in hazard preparedness and planning.

Geomorphic processing of DEMs analyzes the derivatives of digital elevation data such as elevation, slope, and curvature to derive landform units. The alluvial floodplain deposits shown in this map were primarily derived by applying a compound topographic index (CTI) to a 30-meter DEM. The CTI is a function of both the slope and the upstream contributing area and can easily be derived from a DEM. The implementation of CTI using a DEM can be shown as:

$$CTI = \ln (A / \tan (\beta))$$

where A = upstream area calculated as (flow accumulation + 1) * (pixel area in m2) and beta is the slope expressed in radians.

The CTI was reclassified to display only alluvial plain and recent alluvial deposits. These maps may provide a basis for land-use planning and for hazard mitigation near or within the floodplain of Puerto Barrios.

Orthophotos combine the image characteristics of a photograph with the geometric qualities of a map. This digital orthophoto has a 0.5 - meter ground resolution. Original scanned aerial photography (scanned at 7 micron) was acquired from the USGS EROS Data Center. Ground control was acquired from field surveys performed by personnel and contractors from the USGS Mapping and Water Resources Divisions. Orthorectification was performed using ERDAS Imagine 8.5 Orthobase Pro. Digital elevation models used in orthorectification were prepared with ARC/INFO from digital vector layers following standard USGS DEM production procedures.

The orthophoto serves a variety of purposes, from interim maps to field references for earth science investigations and analysis and is useful as a layer of a geographic information system and as a tool for revision of both digital and paper maps. This orthophoto was originally produced to help support to hazard prevention activities and serve as basic level GIS data for municipalities involved in the Mitch reconstruction efforts and to support the municipalities planning efforts.

The contours were digitized from 1:50,000 scale topographic maps by the Instituto Geográfico Nacional de Guatemala. Data have not been altered to match the field checked orthophotos and may be less accurate than the orthophoto imagery.

DESCRIPTION OF MAP UNITS

- Alluvial Plain** - Older unconsolidated surficial materials deposited by fluvial processes. These zones were calculated by geomorphic processing of a 30-meter resolution digital elevation model.
- Recent Alluvial and Active Channel Deposits** - Recent unconsolidated surficial materials deposited by fluvial processes in close proximity to and within the active stream and river channels. These zones were calculated by geomorphic processing of a 30-meter resolution digital elevation model.

EXPLANATION OF MAP SYMBOLS

- Topographic Contours** - Digitized from 1:50,000 scale topographic maps produced by the Instituto Geográfico Nacional de Guatemala.

Derived Alluvial Floodplain Deposits and Digital Orthophoto of Puerto Barrios, Guatemala

By
Peter G. Chirico, Michael B. Warner, and Emily C. Phillips